Meeting the challenges of soil health in dryland wheat

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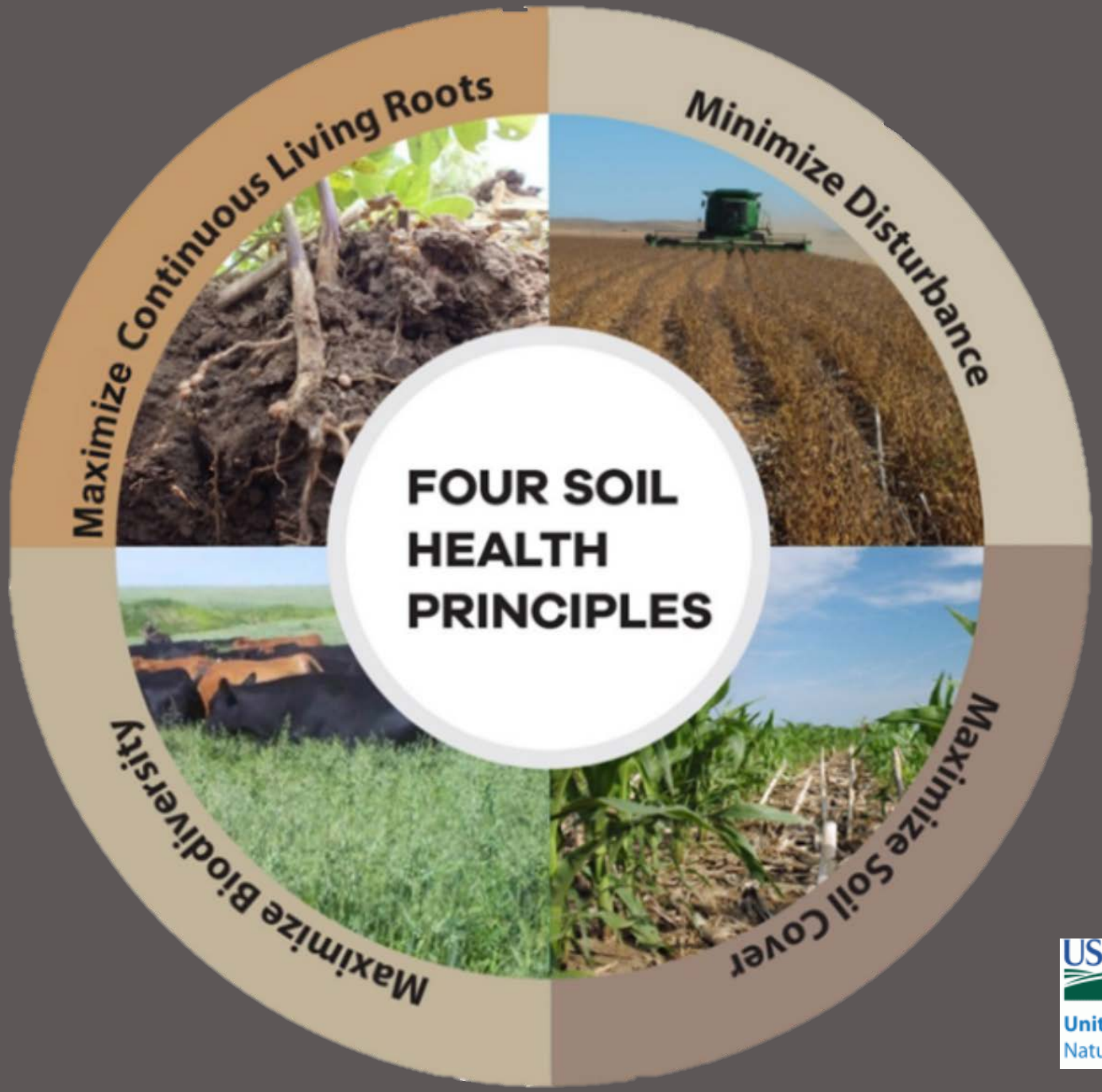
Okanogan Conservation District

Outline

- Background
- Cover crop project
  - Lessons learned
  - Results
- Grazing cover crops



USDA NRCS
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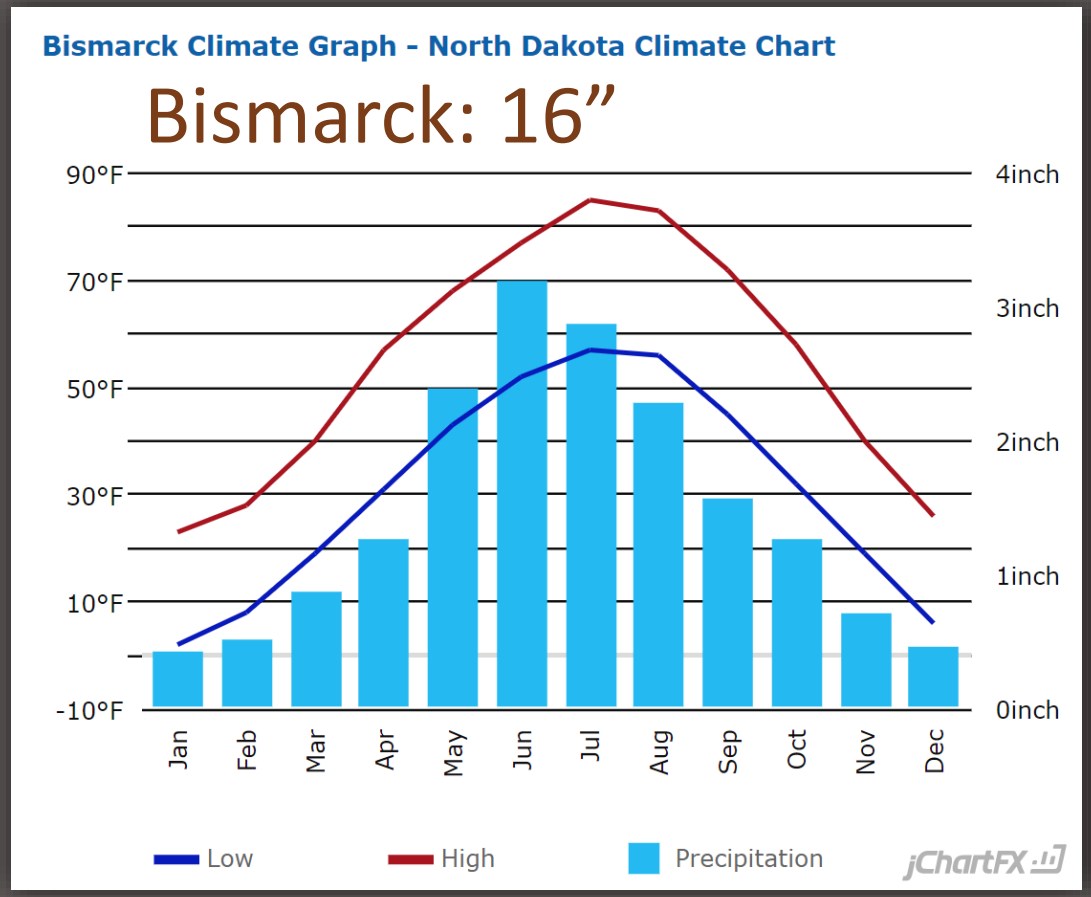
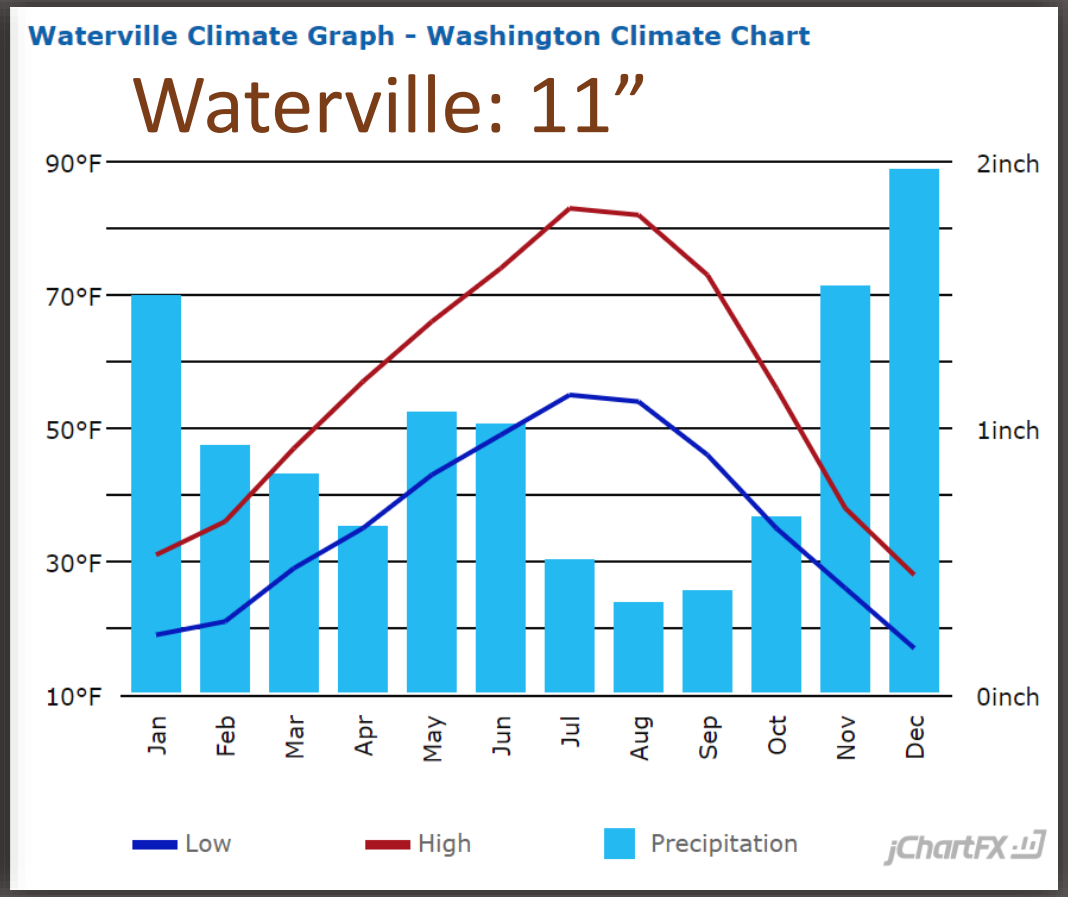
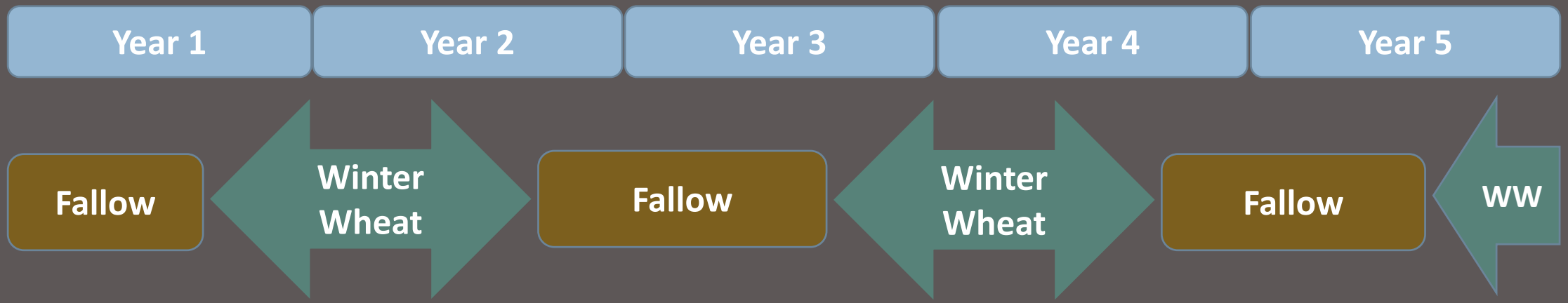
Unique weather regime





https://www.usclimatedata.com/climate

Wheat fallow rotations



- 100 years of wheat-fallow
- Summer or chemical fallow
- ~50% farmers use no-till
- Why fallow
  - Reduces inputs
  - Improves weed & disease control
  - Increases yield

Regional soil characteristics

- 9-13” precipitation
- Shallow soils
- Loam, Silt Loam, Sandy Loam
- 1-2.5% SOM

Spring Cover Crop
92% yield of CO

Changing mentality

- Change “It won’t work here”
- To “How can we get it to work?”

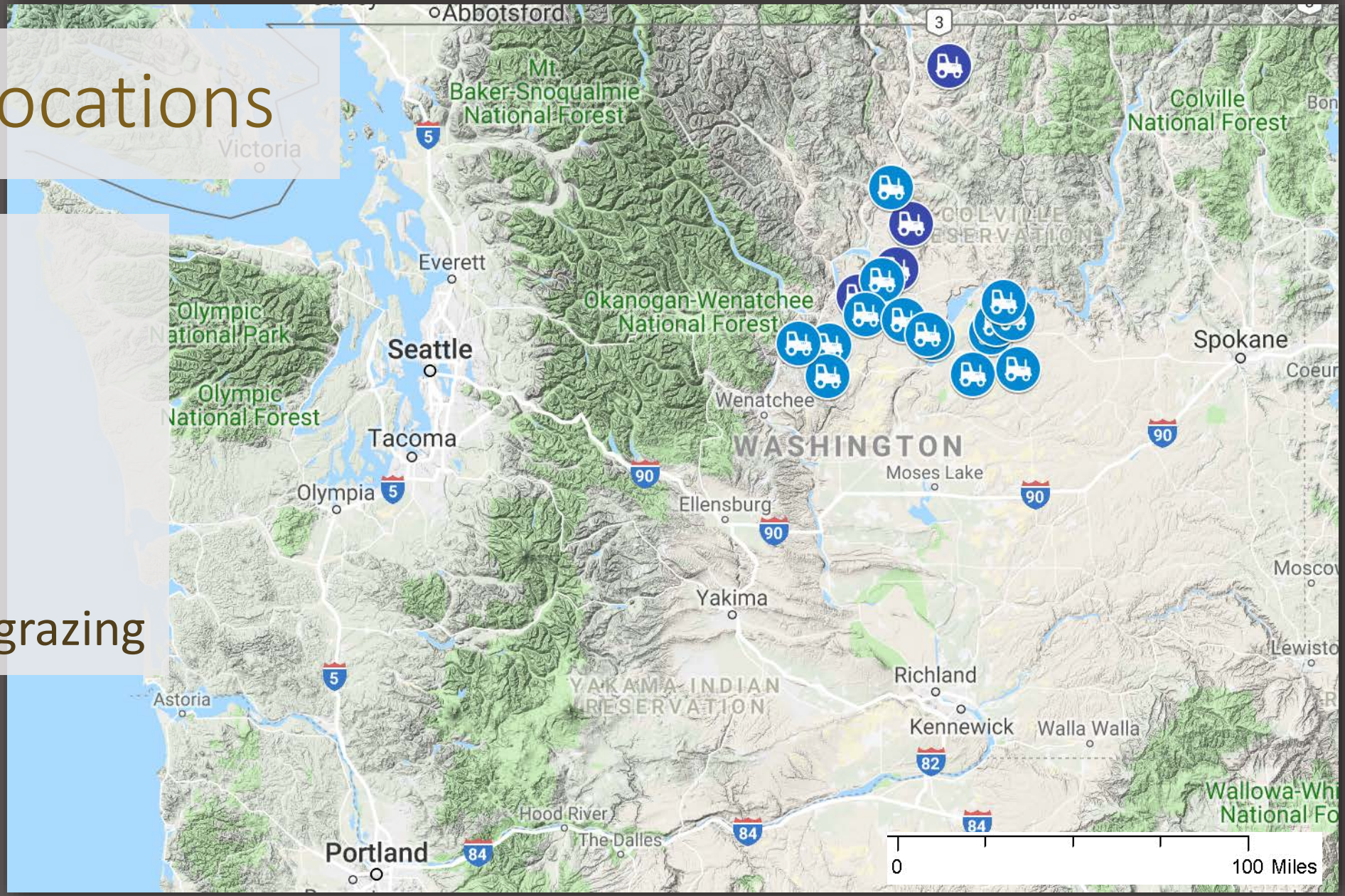
Summer Cover Crop
107% yield of CO

Project locations

- 20 farmers
- 4 years
- 4 counties

2017

- 4 livestock grazing

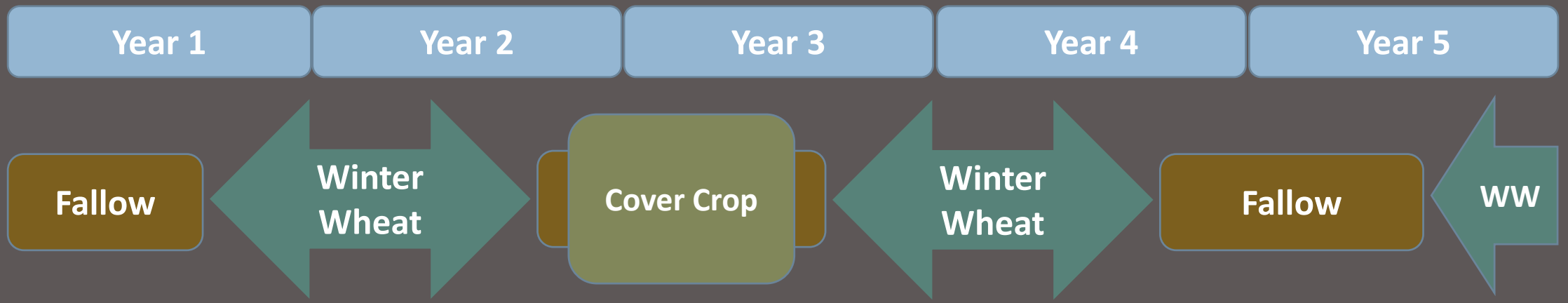


Farmer driven project

- Objectives
  - Water use of cover crops
  - Seasons and species
  - Effect on yield and soil
  - Provide education

Spring Cover Crop
102% yield of CO

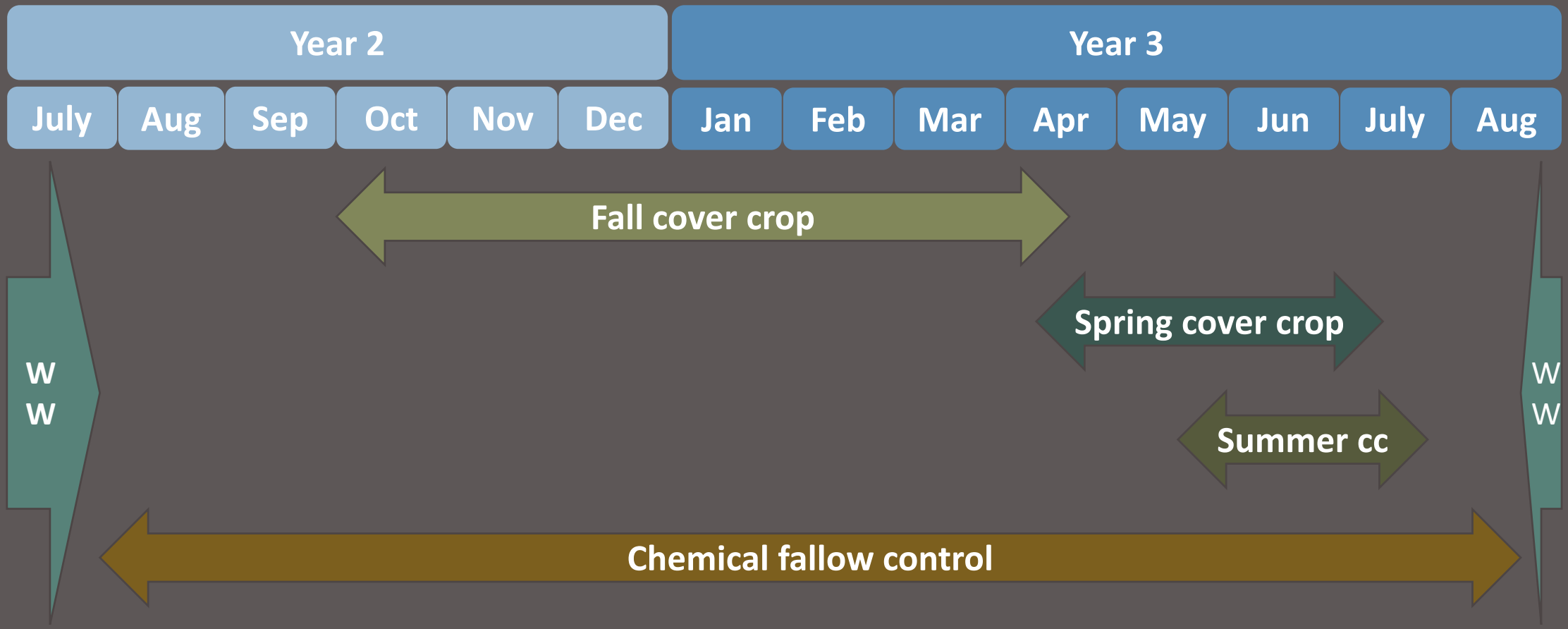
Incorporating cover crops



- Keep living roots growing
- Add diversity
- Increase cover

Summer Cover Crop
78% yield of CO

Cover crop rotations; four treatments



WW=Winter wheat; CC= Cover Crop

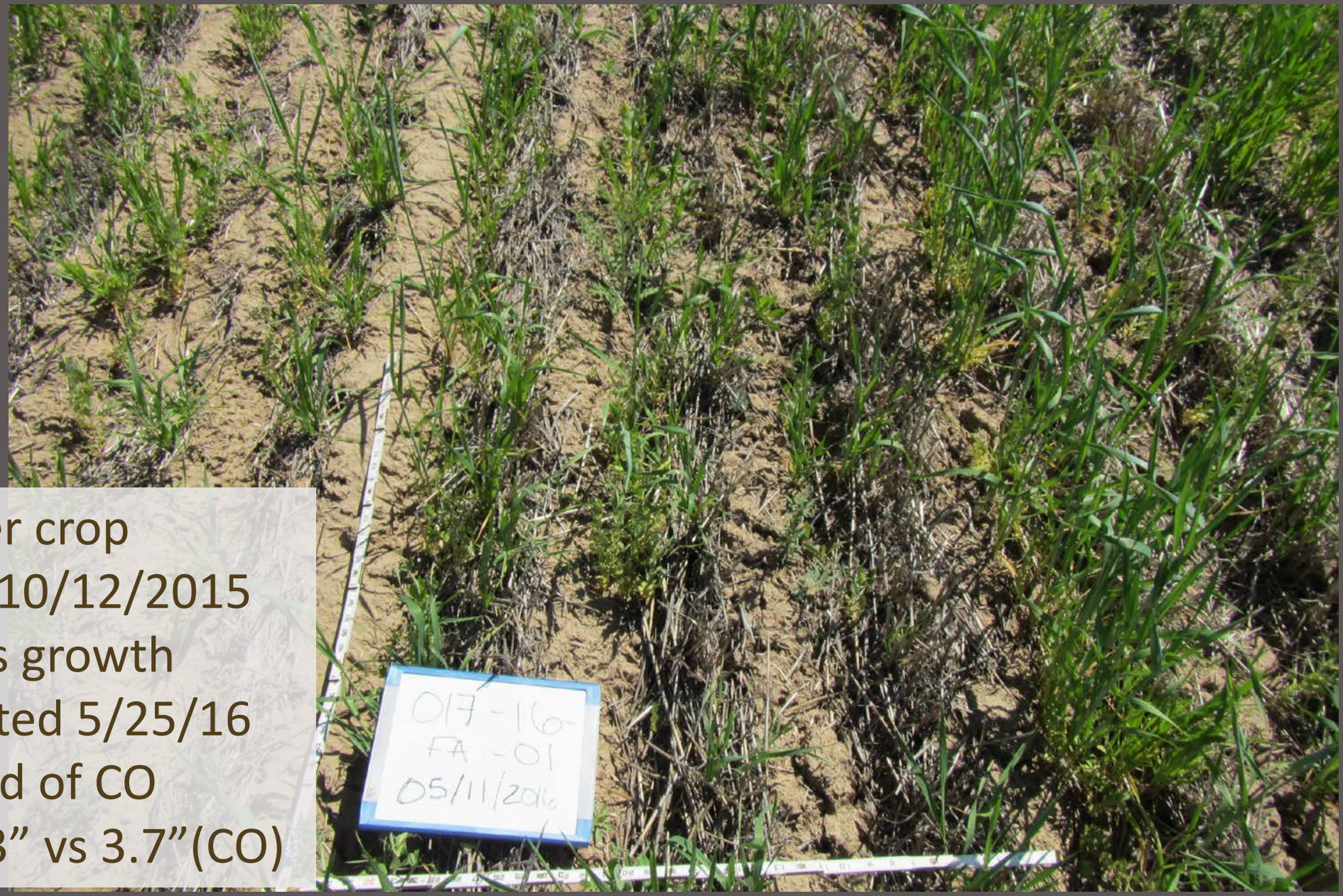
Cover crop mixtures by season

- Planted into winter wheat rotation
- ~12 seeds/sq ft in 10” rainfall zone
- +1 seed for +1” rainfall
- ~20+ seeds/sq ft for grazing
- Rate may vary by season
- Terminate cover crop at 10% flowering
- ~$25/acre on seed

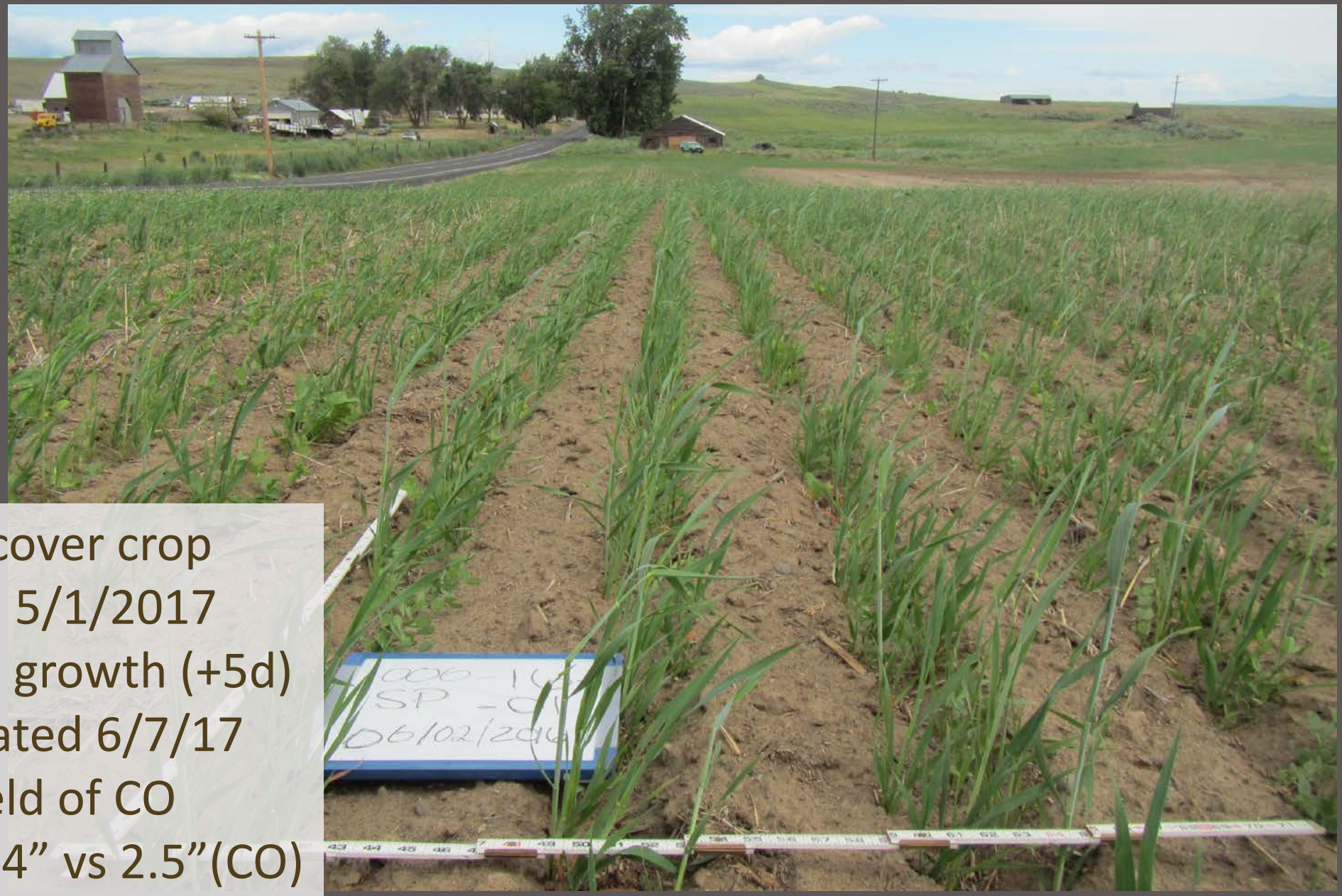
	Fall
Legume	Winter pea
Legume	Lentils
Grass	Barley
Grass	Triticale
Deep rooted	Radish
Deep rooted	

Wheat-fallow control
Harvested July 2017
Replant Aug 2018

Fall cover crop
209 days growth
Terminated 4/25/16
Peas still growing
108% yield of CO
DtM: 2.9”vs2.25”(CO)

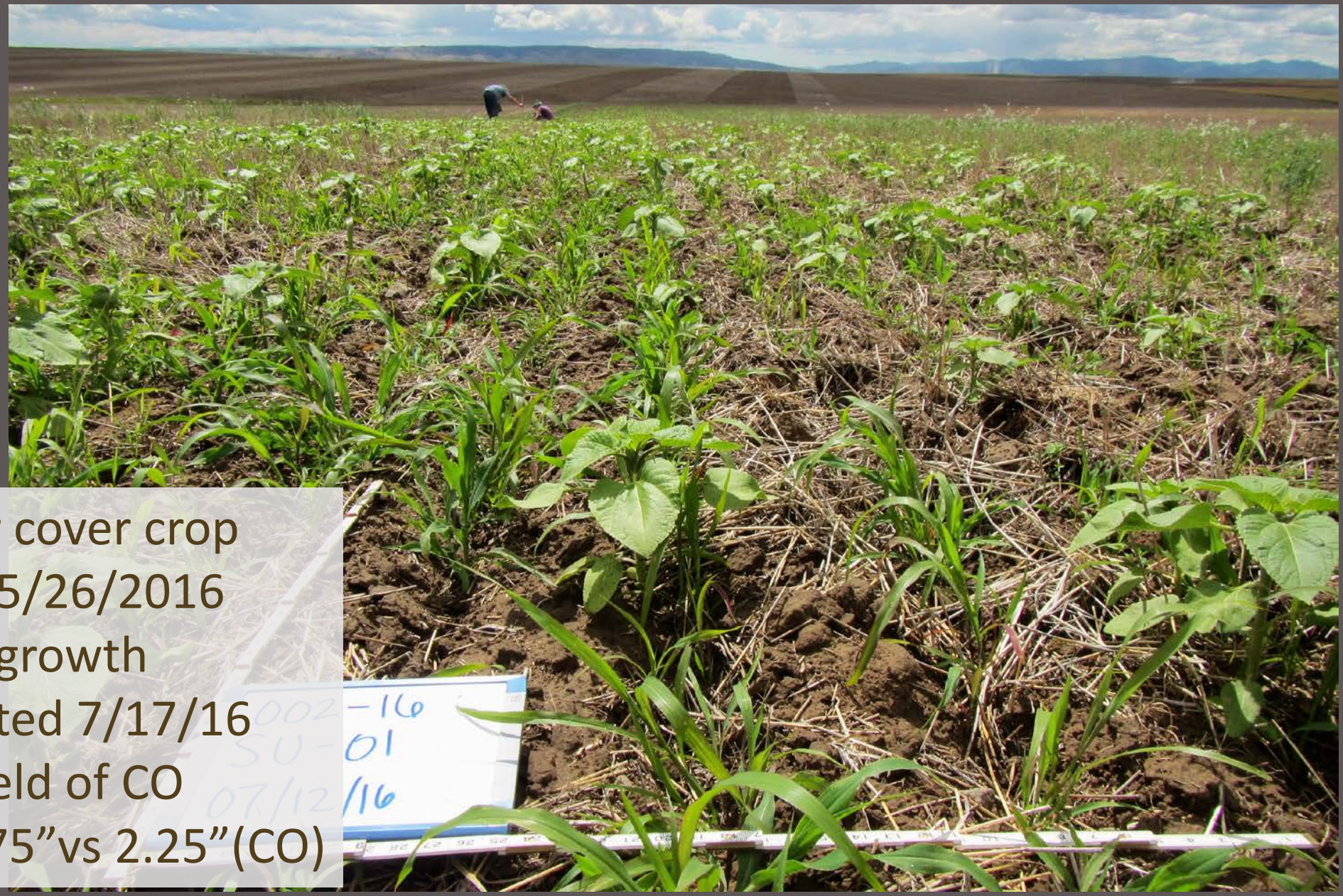


Fall cover crop
Planted 10/12/2015
227 days growth
Terminated 5/25/16
34% yield of CO
DtM: 5.3” vs 3.7”(CO)

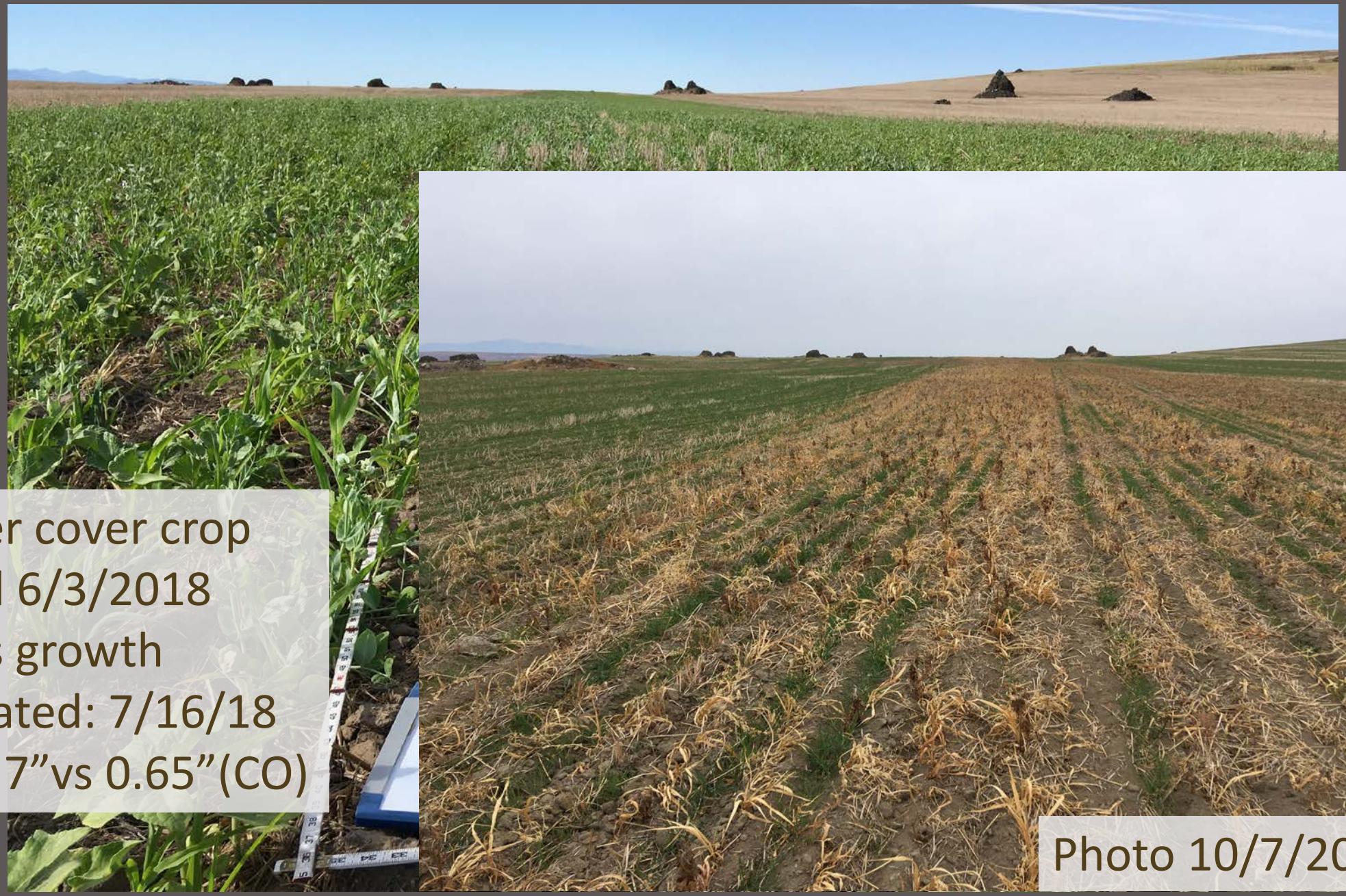


Spring cover crop
Planted 5/1/2017
47 days growth (+5d)
Terminated 6/7/17
98% yield of CO
DtM: 3.4” vs 2.5”(CO)

Spring cover crop
Planted 5/10/2018
61 days growth
Terminated 7/3/18
DtM: 2.6” vs 0.9”(CO)



Summer cover crop
Planted 5/26/2016
52 days growth
Terminated 7/17/16
118% yield of CO
DtM: 1.75”vs 2.25”(CO)



Summer cover crop
Planted 6/3/2018
40 days growth
Terminated: 7/16/18
DtM: 5.7”vs 0.65”(CO)

Photo 10/7/2018

Know what you're planting

- Why – what does it do for the soil
- Will it be problematic
- Will it grow

http://smallfarms.oregonstate.edu/node/54

Summer Cover Crop
98% yield of CO

Control weeds

- Treat 0-14 days prior to planting
- Work with spray rotation
- Hardest control on fall CC
- Easier on late summer CC

Fall Cover Crop
DtM: 2.3” vs 1.9”(CO)

Check field often

- Put in accessible location
- Use shovel or probe
- Check moisture
- Don’t relay on data loggers

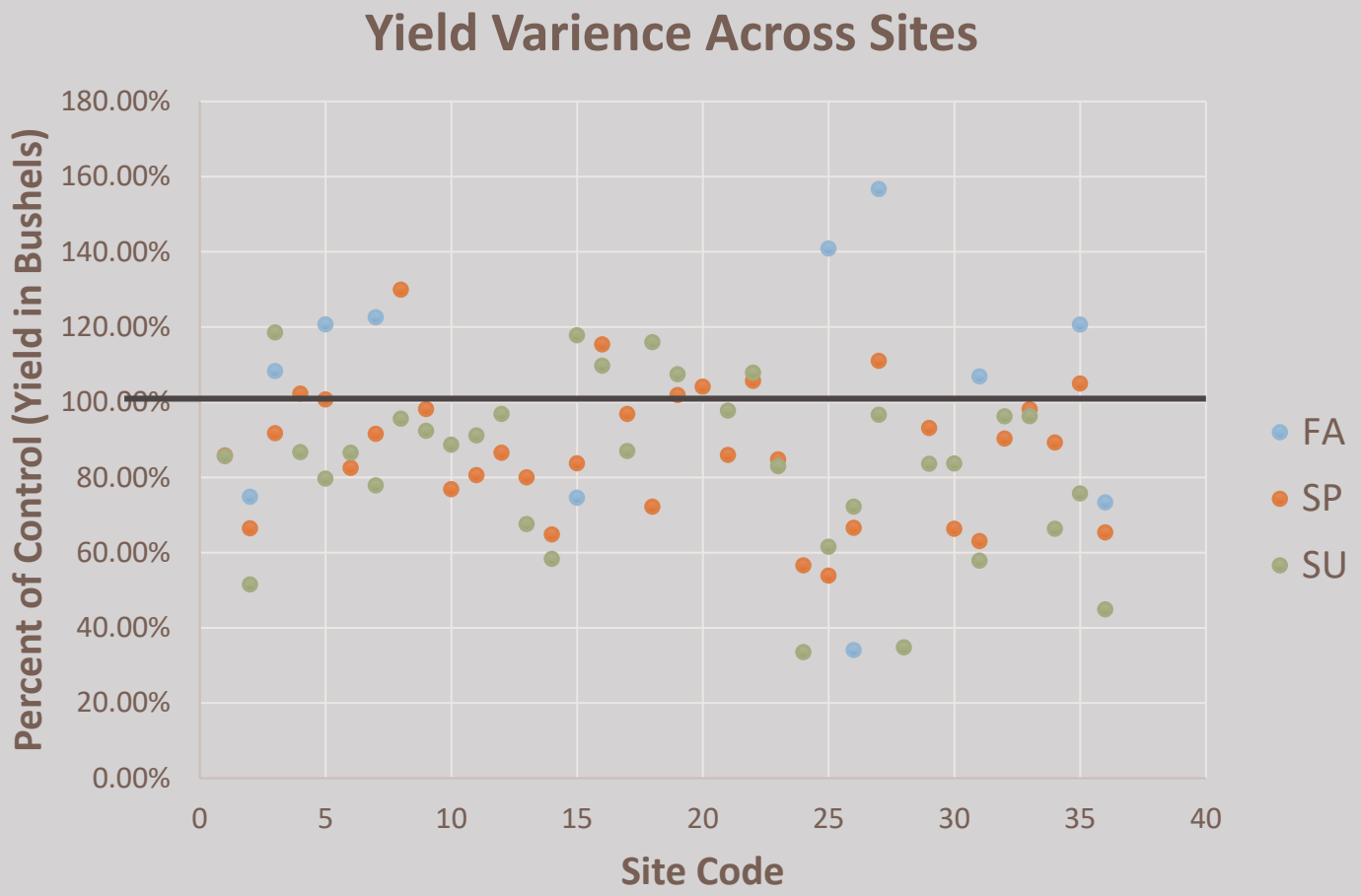
Fall Cover Crop
122% yield of CO

Quantify results

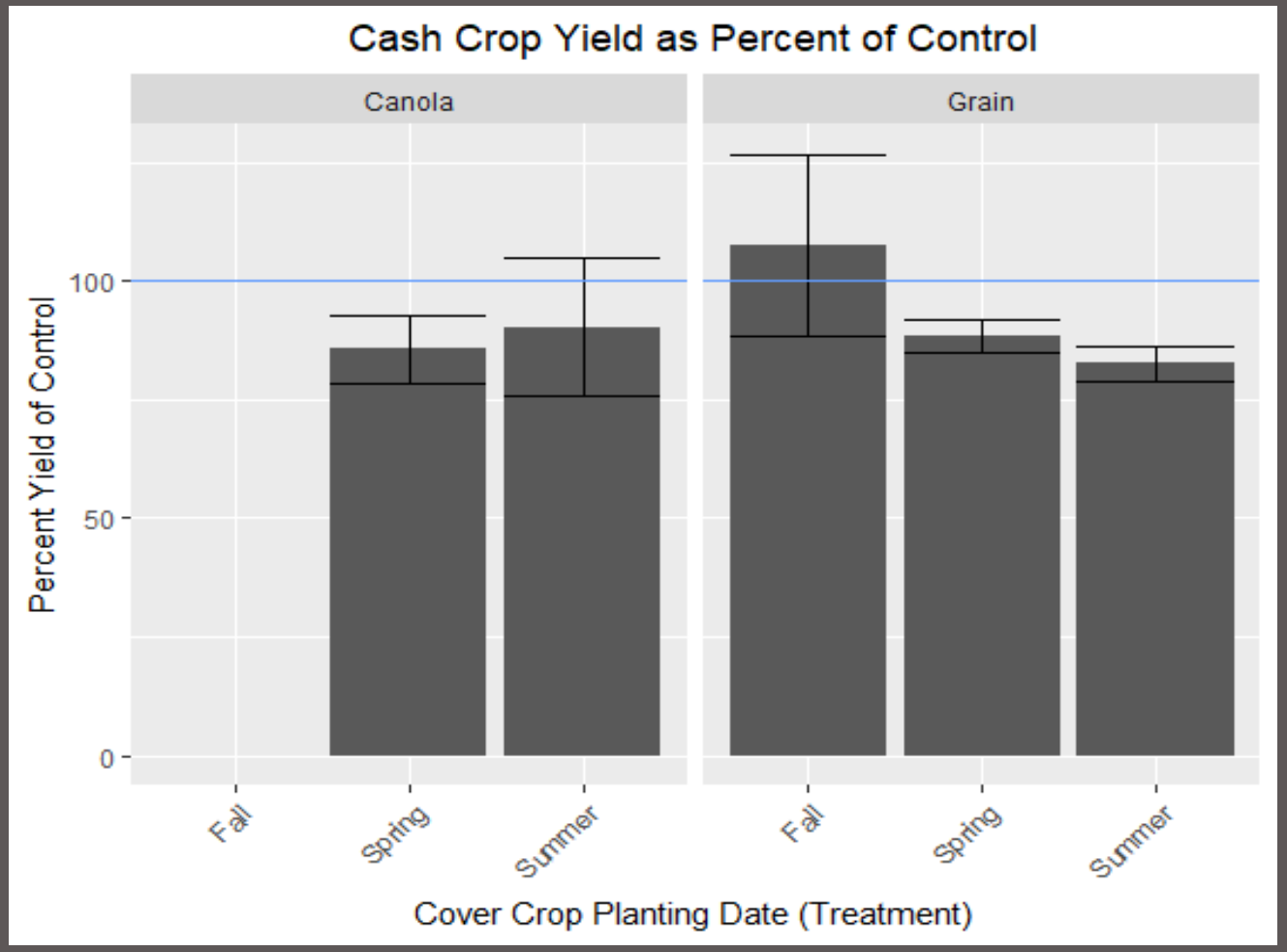
- Keep it simple
- Gather quantitative data
  - Yield
  - Compaction
  - Infiltration
  - Soil tests

Summer Cover Crop
115% yield of CO

Cover crop results



Cover crop results



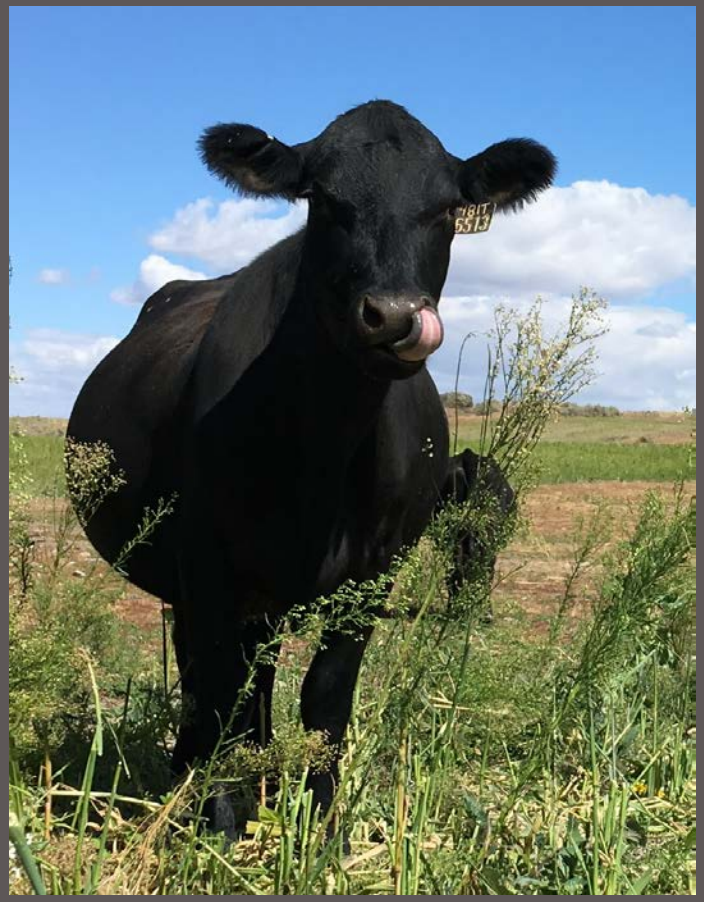
Grazing cover crops

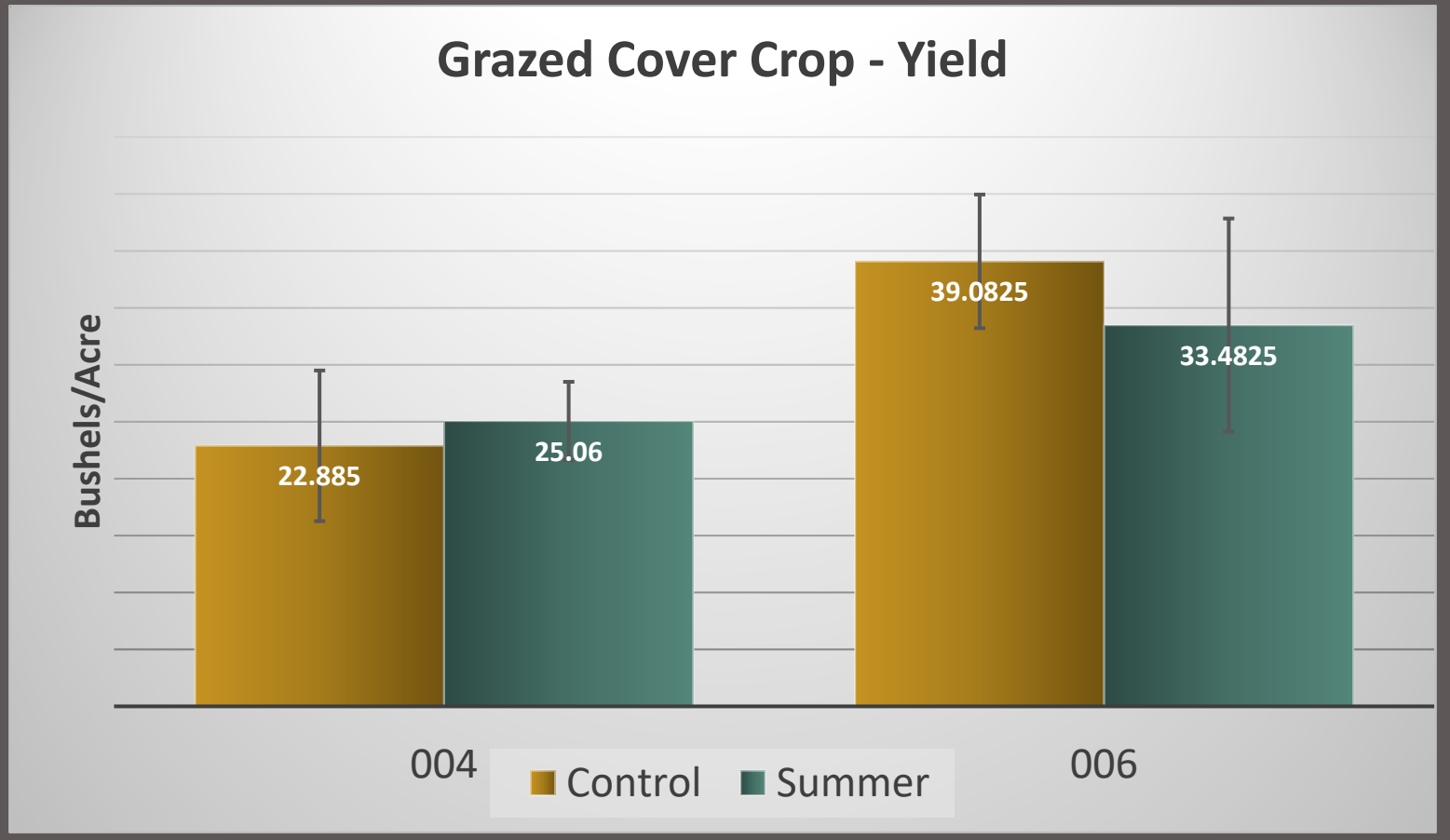
- 30 acres/farm
- Chem-fallow control
- 4 replications/farm
- Weigh livestock
- Collect biomass
- Yield
- Soil samples

Grazing results

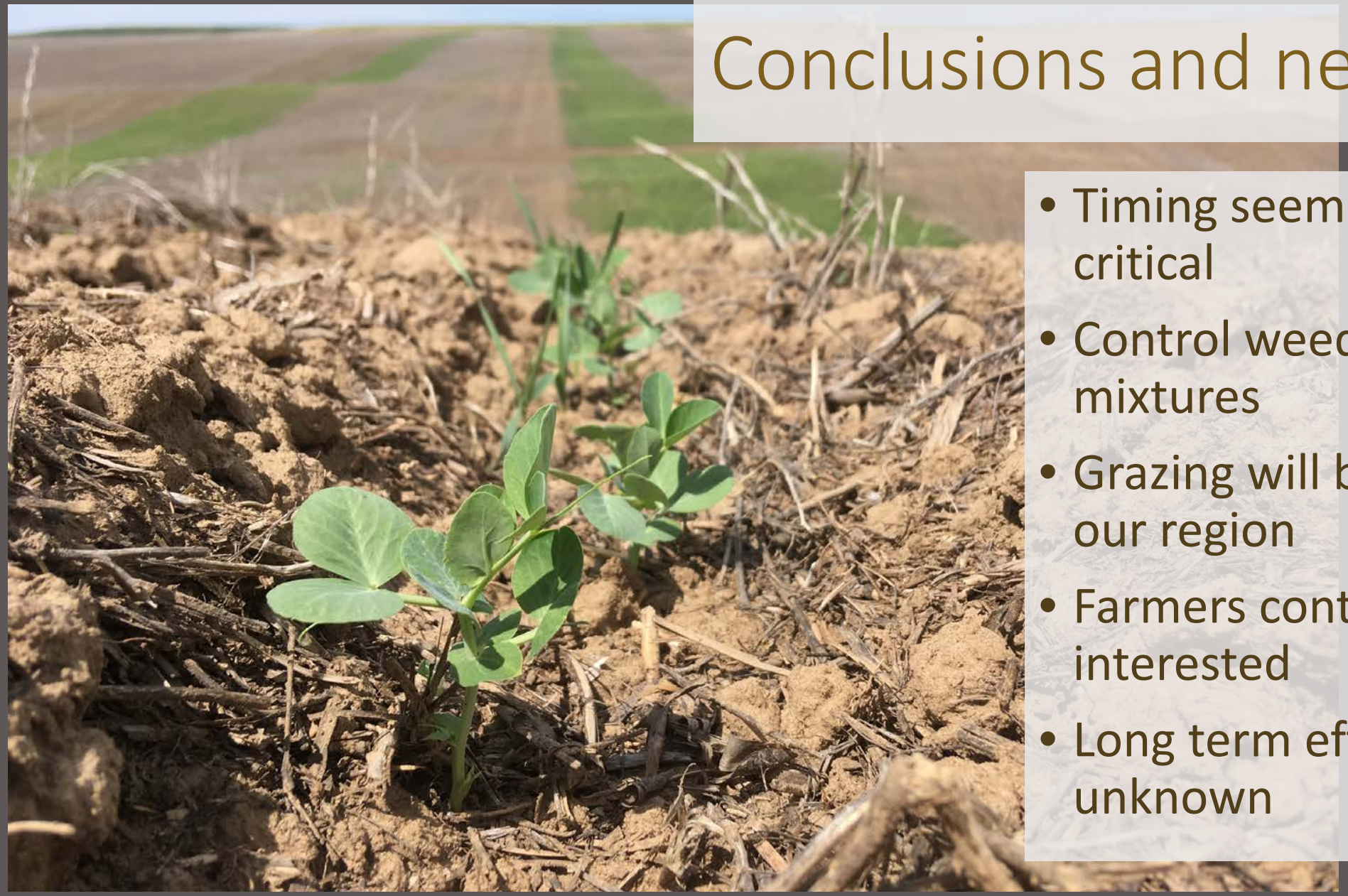
- Varying amounts of biomass
- Varying AUM/farm
- Livestock maintain or gain
- Yield similar with spring cash crop

Grazing cover crops





Conclusions and next steps



- Timing seems to be critical
- Control weeds in fall mixtures
- Grazing will be key in our region
- Farmers continue to be interested
- Long term effects unknown

Academic and Research Advisors

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- Kristen Johnson[1]
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